Network Controller Emulation on a Sidecore for Unmodified Virtual Machines

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Why Emulation?

Client doesn’t need to install anything!
Vendor doesn’t need to develop drivers for every OS!

Improving Emulation 1

TCP Segmentation Offloading
TCP/IP checksum calculation
Unnecessary Copies

Improving Emulation 2?

If only we could remove the Exit overhead...

Improving Emulation 2!

We can remove exits using a Sidecore!!

Core 1 (Sidecore)
Real Sidecore

Core 2 (CPU 1)

Original

Ideal Sidecore

Host
Guest

Paravirtualization

Emulation (E1000)

Paravirtualization (Virtio)

Current Results

Baseline E1000 emulation 500 Mbps
Improved E1000 emulation 4000 Mbps (X8)
Partial Sidecore E1000 emulation 8000 Mbps (X16)

Future Work

Baseline Virtio Paravirtualization 8000 Mbps

Improve Sidecore implementation to be as close to ideal as possible.
Implement E1000 Emulation in kernel space (like Virtio Vhost)
Use single sidecore for multiple guests (like ELVIS)